# 九州北西部糸島半島野北地域の接触変成作用の温度圧力条件
# Pressure-temperature conditions of contact metamorphism in Nokita area, Itoshima Peninsula, northwest Kyushu

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Gneissose granitic rocks are common in high-grade areas of high-temperature low-pressure metamorphic complex. Similarity in age and concordant relation to the surrounding rocks imply that they supplied heat to cause the high-temperature low-pressure metamorphism. Parallelism of internal structures of granitic and metamorphic rocks also suggests that both rocks underwent simultaneous deformation during and after the intrusion of the granitic rocks. The post-metamorphic deformation would rearrange the thermal structure formed at the heat supply.

The Renge metamorphic complex in the Nokita area of Itoshima Peninsula, northwest Kyushu, was intruded by the Kitazaki and Itoshima granodiorites on the north and south at Cretaceous, respectively. The complex was recrystallized by thses intrusions and underwent significant deformation that belongs to flattening after the peak of contact metamorphism (Yamasaki & Ikeda, 2018). This study estimates the pressure-temperature condition preserved in pelitic rocks to evaluate the post-metamorphic deformation.

The pelitic schists in the study area are composed of leucocratic and melanocratic layers depending on the modal amount of biotite. The common constituent minerals are quartz, plagioclase, biotite. Garnet, muscovite, and K-feldspar locally occur. In addition, chlorite is present as veins and schistosity-forming mineral, which is interpreted as retrograde products.

Four pelitic schists were employed to estimate the metamorphic conditions. Garnet shows euhedral shape and so-called normal zoning where Mg increases and Fe and Mn decreases towards the rim. The composition of rim ranges such that Xalm=0.72-0.80, Xprp=0.09-0.12, Xsps=0.06-0.16, and Xgrs=0.04-0.06. On the other hand, that of core varies Xalm=0.50-0.66, Xprp=0.03-0.05, Xsps=0.24-0.40, and Xgrs=0.04-0.10. The Mg/Fe of rim and core ranges 0.13-0.15 and 0.06-0.08, respectively. Biotite also shows significant variation in composition, i.e., Ti of 0.15 - 0.46 based on 22 oxygen, and Mg/Fe of 0.44 - 0.76. The Ti content of biotite near chlorite is low as compared with that far from chlorite. Plagioclase is chemically homogeneous in one sample. The anorthite content shows southward increase from 0.23 to 0.42.

We chose the composition equilibrated at peak of the metamorphism such as the highest Mg/Fe in the rim of garnet, highest Ti in biotite and highest anorthite content in plagioclase. Geothermobarometry using garnet-biotite geothermometer (Ferry & Spear 1978) and a garnet-biotite-plagioclase-quartz geobarometer (Hoisch 1990) provide the metamorphic conditions of 590 °C, 1.4 kbar, 650 °C, 3.5 kbar, 770 °C, 4.2 kbar, and 650 °C, 2.8 kbar from south to north ,which corresponds to 5.3-16 km depth. The pressure and temperature vary by 2.8 kbar and 180 °C, respectively, within ca. 300 m distance. The lithostatic pressure relevant to 300 m thickness cannot explain the pressure difference of 2.8 kbar. The

 

present result also supports the significant thinning deformation after the contact metamorphism.

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